



PATENT APPLICATION

IN THE U.S. PATENT AND TRADEMARK OFFICE

September 12, 2008

Applicants: Yoshio KAJIYA et al

For: METHOD OF PRODUCING CATHODE MATERIAL  
FOR LITHIUM SECONDARY CELL

Serial No.: 10/521 370 Group: 1795

Confirmation No.: 2268

Filed: January 12, 2005 Examiner: Echelmeyer

International Application No.: PCT/JP2003/002027

International Filing Date: February 25, 2003

Atty. Docket No.: 4402.P0666US

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

**LETTER TRANSMITTING APPEAL BRIEF FEE**

Sir:

Enclosed is Appellants' check in the sum of \$970.00, representing payment of the Time Extension and Appeal Brief fee. The Commissioner is hereby authorized to charge any additional fee which may be required by this paper, or to credit any overpayment, to Deposit Account No. 06-1382. A duplicate copy of this sheet is enclosed.

Respectfully submitted,

IN DUPLICATE

  
Terryence F. Chapman

TFC/smd

(Please see the following page.)

**CERTIFICATE OF MAILING**

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Terryence F. Chapman

FLYNN, THIEL, BOUTELL & TANIS, P.C. 2026 Rambling Road Kalamazoo, MI 49008- 1631 Phone: (269) 381-1156 Fax: (269) 381-5465	David G. Boutell Terryence F. Chapman Mark L. Maki Liane L. Churney John A. Waters Brian R. Tumm Donald J. Wallace Dale H. Thiel Sidney B. Williams, Jr. Heon Jekal	Reg. No. 25 072 Reg. No. 32 549 Reg. No. 36 589 Reg. No. 40 694 Reg. No. 24 802 Reg. No. 36 328 Reg. No. 43 977 Reg. No. 24 323 Reg. No. 24 949 Reg. No. L0379*
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Appellants' Brief on Appeal  
Claims Appendix  
Evidence Appendix  
Related Proceedings Appendix



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**APPELLANTS' BRIEF ON APPEAL**

Sir:

This is an appeal from the decision of the Examiner dated November 14, 2007, finally rejecting Claims 1-8.

**REAL PARTY IN INTEREST**

Nikko Materials Co., Ltd. is the assignee of the present application and the real party in interest.

**RELATED APPEALS AND INTERFERENCES**

There are no related appeals and interferences to the present application.

**STATUS OF CLAIMS**

Claims 1-8 are pending, have been finally rejected and are the claims on consideration on appeal.

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#### STATUS OF AMENDMENTS

A request for reconsideration dated February 7, 2008 has been considered by the Examiner.

#### SUMMARY OF CLAIMED SUBJECT MATTER

Appellants' invention, as defined by independent Claim 1, is directed to a method of producing a cathode material for a lithium secondary cell. The method comprises the steps of preparing a solution selected from the group consisting of an alkaline solution, a carbonate solution, and a hydrogencarbonate solution, with either an oxide or a carbonate of a metal, as a major component of the cathode material for the lithium secondary cell, suspended therein, dripping an aqueous solution of a salt of another element into the solution, precipitating and bonding a compound of the other element on the surface of the oxide or carbonate of the metal, as a major component, subsequently preparing a mixture by mixing either the oxide or the carbonate of the metal, as a major component, with the compound of the other element, precipitated and bonded thereon, with a lithium compound, and firing the mixture (clean copy of specification page 5, first full paragraph and clean copy of specification page 7, lines 30-35).

#### GROUND OF REJECTION TO BE REVIEWED ON APPEAL

The first ground of rejection to be reviewed on appeal is whether Claims 1-5 and 8 are unpatentable under 35 USC 103(a) over Fujino et al in view of Horowitz et al. The second ground of rejection for review on appeal is whether Claims 6 and 7 are unpatentable under 35 USC 103(a) over Fujino et al in view of Horowitz et al and further in view of Kumta et al.

#### ARGUMENT

The present invention is directed to a method for producing a cathode material used in a lithium secondary cell. This method involves the steps of preparing a solution

selected from the group consisting of an alkaline solution, a carbonate solution and a hydrogencarbonate solution, with either an oxide or a carbonate of a metal, as the major component of the cathode material for the lithium secondary cell, suspended therein, dripping an aqueous solution of a salt of another element into the solution, precipitating and bonding a compound of the other element on the surface of the oxide or carbonate of the metal, as a major component, preparing a mixture by mixing the oxide or the carbonate of the metal, as the major component, with the compound of the other element, precipitated and bonded thereon, with a lithium compound, and firing the mixture.

There are four crucial steps required in the present invention. The first step requires the preparation of a solution from an alkaline solution, a carbonate solution or a hydrogencarbonate solution, with the solution having an oxide or carbonate of a metal suspended therein. The second step requires the dripping of an aqueous solution of a salt of another element into the solution to precipitate and bond a compound of the other element on the oxide or carbonate of the metal. The third step requires the mixing of the oxide or carbonate of the metal with the compound of the other element precipitated and bonded thereon with a lithium compound to form a mixture and the fourth step requires the mixture to be fired.

The present invention is based on the discovery that when doping a cathode material for a lithium secondary cell, when a compound of a doping element is first precipitated and bonded on the surface of a compound of a metal, as the major component of the cathode material for a lithium secondary cell, in powdery form, by the use of a chemical method and, subsequently, the compound of the metal having the doping element deposited thereon is mixed with a lithium compound and subsequently fired, a cathode material is produced which gives the lithium secondary cell excellent initial capacity, cycle characteristics and safety. The prior art cited by the

Examiner, either singularly or in combination, do not disclose the presently claimed invention.

REJECTION OF CLAIMS 1-5 AND 8  
UNDER 35 USC 103(a) AS BEING UNPATENTABLE  
OVER FUJINO ET AL IN VIEW OF HOROWITZ ET AL

Fujino et al is directed to a process for making a cobalt-coated lithium manganese complex oxide which comprises the steps of oxidizing lithium manganese complex oxide particles dispersed in an aqueous alkali solution and a cobalt compound at a temperature of from 20-100°C to epitaxially grow cobalt oxide on the lithium manganese complex oxide, and collecting the resulting oxide after filtration, washing and drying. The cobalt oxide is epitaxially grown on the surface of a lithium manganese complex oxide which has already been prepared.

In contrast to Fujino et al, the present invention forms the lithium complex oxide through the firing of the mixture of the chemical compound, as a major component, with the compound of the other element precipitated and bonded thereon, with a lithium compound. In Fujino et al, cobalt oxide is coated on the formed lithium manganese complex oxide. Therefore, none of the presently claimed steps are shown in the Fujino et al reference. Therefore, the secondary Horowitz et al reference must provide the motivation to one of ordinary skill in the art to modify the primary Fujino et al reference in a manner that would yield the presently claimed invention. It is respectfully submitted that the Horowitz et al reference contains no such disclosure.

The Horowitz et al reference discloses the use of high surface area mixed metal oxides of manganese and calcium and electrochemical processes. This reference discloses in Examples 1 and 2 that when a mixture of oxides is fired in air or oxygen, the product oxide along with impurity phases is formed and that continued firings interrupted by frequent re-grinding will decrease the amount of impurity phases

present. However, nothing in this reference suggests using the presently claimed process steps in order to obtain the cathode material of the present invention. Secondly, the product lithium manganese complex oxide of Fujino et al is not obtained by a firing process as is required by Horowitz et al. As such, firing to obtain a product oxide and then continued firing as is required by Horowitz et al would not be applied by one of ordinary skill in the art to Fujino et al since the product lithium manganese complex oxide is obtained without firing. Therefore, it is respectfully submitted that Fujino et al in combination with Horowitz et al does not even teach any of the steps of the presently claimed invention and Claims 1-5 and 8 are clearly patentably distinguishable over these references.

REJECTION OF CLAIMS 6 AND 7  
UNDER 35 USC 103(a) AS BEING UNPATENTABLE  
OVER FUJINO ET AL IN VIEW OF HOROWITZ ET AL  
AND FURTHER IN VIEW OF KUMTA ET AL

The combination of Fujino et al and Horowitz et al has been discussed above. The Kumta et al reference has been cited by the Examiner to teach a lithium cobalt oxide doped with magnesium. However, although this reference discloses four general methods for preparing the metal oxide materials disclosed there, none of these methods show the presently claimed steps for preparing a cathode material for a lithium secondary cell. Therefore, Kumta et al in combination with Horowitz and Fujino et al does not even present a showing of prima facie obviousness under 35 USC 103(a) with respect to the presently claimed invention.

CONCLUSION

For the reasons advanced above, it is respectfully submitted that the references cited by the Examiner do not show the claimed process step for preparing a cathode material for a lithium secondary cell. As such, Appellants

respectfully request reversal of the Examiner's rejection of the currently pending claims.

Respectfully submitted,

  
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Terryence F. Chapman

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Encl: Claims Appendix  
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Terryence F. Chapman

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CLAIMS APPENDIX

1. A method of producing a cathode material for a lithium secondary cell, comprising the steps of preparing a solution selected from the group consisting of an alkaline solution, a carbonate solution, and a hydrogencarbonate solution, with either an oxide or a carbonate of a metal, as the major component of the cathode material for the lithium secondary cell, suspended therein, dripping an aqueous solution of a salt of another element into the solution, precipitating and bonding a compound of the other element on the surface of the oxide or carbonate of the metal, as the major component, subsequently preparing a mixture by mixing either the oxide or the carbonate of the metal, as the major component, with the compound of the other element, precipitated and bonded thereon, with a lithium compound, and firing the mixture.

2. A method of producing a cathode material for a lithium secondary cell, according to Claim 1, wherein either the oxide or the carbonate of the metal, as the major component, is an oxide or carbonate of an element selected from the group consisting of elements Co, Mn, and Ni.

3. A method of producing a cathode material for a lithium secondary cell, according to Claim 1, wherein the other element is at least one element selected from the group consisting of Sc, Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Li, Na, K, Rb, Cs, Fr, Be, Mg, Ca, Sr, Ba, Ra, B, and Al.

4. A method of producing a cathode material for a lithium secondary cell, according to Claim 1, wherein the ratio of either the oxide or the carbonate of the metal, as the major component, to the other element is in the range of 99:1 to 40:60, in terms of mole ratio.

5. A method of producing a cathode material for a lithium secondary cell, according to Claim 1, wherein either the oxide or the carbonate of the metal, as the major component, is a Mn oxide or Mn carbonate, and the other element is at least one element selected from the group consisting of Co, Ni, Al, Mg, and Ti.

6. A method of producing a cathode material for a lithium secondary cell, according to Claim 1, wherein either the oxide or the carbonate of the metal, as the major component, is a Co oxide or Co carbonate, and the other element is at least one element selected from the group consisting of Mn, Ni, Al, Mg, and Ti.

7. A method of producing a cathode material for a lithium secondary cell, according to Claim 1, wherein either the oxide or the carbonate of the metal, as the major component, is a Ni oxide or Ni carbonate, and the other element is at least one element selected from the group consisting of Co, Mn, Al, Mg, and Ti.

8. A method of producing a cathode material for a lithium secondary cell, according to Claim 1, wherein the oxide or the carbonate of the metal is an oxide or carbonate of Co or Mn and the other element is at least one member selected from the group consisting of Sc, Ti, V, Cr, Mn, Fe, Co, Cu, Li, Na, K, Rb, Cs, Fr, Be, Mg, Ca, Sr, Ba, Ra, B and Al.

EVIDENCE APPENDIX

There is no extrinsive evidence relied upon by Appellants in the appeal.

RELATED PROCEEDINGS APPENDIX

There are no related proceedings to the present application.